



DEPARTMENT OF THE NAVY

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NAVTESTWINGLANT/NAVTESTWINGPACINST 3500 1
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NAVTESTWINGLANT/NAVTESTWINGPAC INSTRUCTION 3500 1

From Commander, Naval Test Wing Atlantic
Commander, Naval Test Wing Pacific

Subj NAVAL TEST WING ATLANTIC AND NAVAL TEST WING PACIFIC
OPERATIONAL RISK MANAGEMENT PROGRAM

Ref (a) OPNAVINST 3500 39A
(b) MARINE CORPS ORDER 3500 27A
(c) Naval Doctrine Publication/Naval Warfare 28 Mar 94

Encl (1) Operational Risk Management (ORM) Organization,
Policies, and Guidance
(2) Introduction to Operational Risk Management (ORM)

1 Purpose To establish Operational Risk Management (ORM), in accordance with references (a) through (c), as the method to manage risk, in the Naval Test Wing Atlantic (NAVTESTWINGLANT) and the Naval Test Wing Pacific (NAVTESTWINGPAC) operations, maintenance, training, and planning at all levels in order to enhance mission accomplishment while reducing risk to an acceptable level

2 Cancellation NAVTESTWINGLANT Instruction 3500 1 of
7 August 2002

3 Scope This instruction shall apply to all military, civil service, and contractor personnel, directly involved with flight operations as part of, or in support of NAVTESTWINGLANT and NAVTESTWINGPAC

4 Objective The objective of the NAVTESTWINGLANT and NAVTESTWINGPAC ORM Program is to optimize operational capability, readiness, and use ORM as a decision making process. The fundamental principles that shall be adhered to are

- a Accept risk when benefits outweigh the cost
- b Accept no unnecessary risk
- c Anticipate and manage risk by planning

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d Make risk decisions at the right level

Enclosure (1) describes the policies and organizations that NAVTESTWINGLANT and NAVTESTWINGPAC shall use to implement and sustain the ORM Program. Enclosure (2) is an introduction to ORM.

5 Background NAVTESTWINGLANT and NAVTESTWINGPAC have embraced new programs, processes, and ideas that have resulted in efficient and safe operations. The recent mishaps throughout the Navy and specifically in NAVAIR require that we rethink the way we currently conduct our flight operations. The Navy and Marine Corps have embraced the concept that an effective ORM Program will reduce operational risks and enhance mission capability. NAVTESTWINGLANT and NAVTESTWINGPAC will adopt the ORM process as an integral part of the way we do business. This organization must evolve in the way it conducts its operations if it is to remain effective and viable in conducting its Research, Development, Test and Evaluation mission. NAVTESTWINGLANT and NAVTESTWINGPAC will set the standard in the integration of ORM into all of our operations.

6 Discussion

a Dissemination NAVTESTWINGLANT and NAVTESTWINGPAC shall fully support the Navy's ORM Program. All members of the Command will be informed of this instruction and its applicability to their position.

b Indoctrination All personnel shall receive a unit indoctrination on ORM that includes a discussion of the ORM Program and their individual ORM training requirements.

c Communication The effectiveness of the ORM Program will be reflected by the identification of risk communicated to the appropriate level. Leaders will learn and use ORM terminology in support of unit operations.

d Examination All NAVTESTWINGLANT and NAVTESTWINGPAC flight operations shall be planned using ORM as the risk assessment process. Risk that cannot be mitigated will be sent to the appropriate level for decision on acceptance. TEST PLANS that are prepared and approved in accordance with NAVAIR Instruction 3960 4A are considered to have completed the ORM process.

7 Action All NAVTESTWINGLANT and NAVTESTWINGPAC activities shall apply the principles of ORM in operations planning, flight

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and flight/ground related testing, maintenance and training
NAVTESTWINGLANT and NAVTESTWINGPAC shall provide policy
sponsorship for the ORM Program by the following actions

a Commander NAVTESTWINGLANT or Commander NAVTESTWINGPAC is
the approving authority for all evolutions in which the final
Risk Assessment Code (RAC) is RAC 1 (critical) (enclosure (2))

b NAVTESTWINGLANT and NAVTESTWINGPAC Operations Officers
shall integrate ORM into existing programs Integrate ORM
concepts and applications in appropriate instructions and
directives Conduct a Quarterly ORM Program Managers Council

c NAVTESTWINGLANT and NAVTESTWINGPAC Aviation Safety
Officers and Deputy Aviation Safety Program Manager shall serve
as technical advisors on the ORM Program and training

d NAVTESTWINGLANT and NAVTESTWINGPAC Maintenance Officers
shall integrate ORM into existing maintenance programs
Integrate ORM concepts and applications in appropriate
instructions and directives

e Squadron/Unit Commanding Officers (CO's) shall

(1) Implement the ORM process within their commands

(2) Provide training resources to Squadron/Unit
(military/civilian/contractor) personnel on ORM

(3) Incorporate the identified hazards, risk
assessments, and controls into notices, instructions,
directives, written plans and briefs

(4) Conduct a risk assessment for all flight evolutions,
to mitigate risk to an acceptable level Final RAC should be
assigned based on highest residual risk Approval of evolutions
will be in accordance with Squadron Risk Acceptance policy

f ORM Program Managers shall

(1) Address the ORM process in operations, safety,
training, and lessons learned reports Reports should comment
on unit and individual training, hazards, risk assessments, and
implemented control effectiveness Squadrons/units will develop
report requirements based on mission requirements and
composition

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(2) Inform the chain of command as to what hazards cannot be controlled or mitigated at their command level

(3) Attend the respective TESTWING ORM Council Meeting

g Department Heads shall

(1) Review all evolutions using the ORM process

(2) Coordinate with the ORM program managers for all ORM related training or technical matters

(3) Insure that risk decisions are made at the appropriate level This should be in accordance with Squadron/unit policy

h Individuals shall

(1) Complete ORM training

(2) Use the ORM process on and off-duty

(3) Maintain the highest standards of professionalism in all duties

8 Review The NAVTESTWINGLANT and NAVTESTWINGPAC Operations and Aviation Safety Officers shall review this instruction annually, on its anniversary date, and revise as necessary


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OPERATIONAL RISK MANAGEMENT (ORM) ORGANIZATION, POLICIES AND GUIDANCE

1 Organization

a CO's shall establish, by instruction, a unit-level ORM Program managed by an ORM Program Manager Squadron CO's shall ensure that ORM is incorporated into planning and execution of all aviation evolutions, including operational, test, research, maintenance, and training

b Organization Each Squadron shall designate an ORM Program Manager to oversee unit training and implementation The ORM program is designed to assist decision makers and as such the selection of a Program Manager is critical Program managers shall routinely evaluate their units' application of risk management

2 Implementing Policies and Guidance

a ORM is not a substitution for leadership, standards, compliance or communication It is a process that will enhance our decision-making abilities and risk acceptance policies Naval Warfare Publication 1 states, "Risk management and risk assessment are formal, essential tools of operational planning Sound decision making requires the use of these tools both in battle and in training " ORM, described in enclosure (2), is a method for identifying hazards, assessing risks and implementing controls to reduce the risk associated with any operation NAVTESTWINGLANT and NAVTESTWINGPAC operational missions, as well as individual daily routines, involve some degree of risk Every operation, both on and off-duty requires a degree of decision making that includes risk assessment and risk management

b NAVTESTWINGLANT and NAVTESTWINGPAC ORM Vision is NAVTESTWINGLANT and NAVTESTWINGPAC shall develop an environment where every Leader, Sailor, Marine and Civilian is trained and motivated to personally manage risk in everything they do.

c Squadron CO's shall develop ORM goals to support the NAVTESTWINGLANT and NAVTESTWINGPAC ORM Vision Supervision and follow-up are essential in sustaining our vision

d Leadership ORM decisions are made by the leader directly responsible for the mission Prudence, experience,

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judgment, intuition and situational awareness are critical elements in making effective risk management decisions. When the leader responsible for executing the mission determines that the risk associated with that mission cannot be controlled at his/her level, or goes beyond the commander's stated intent, he/she shall elevate the decision to his/her chain of command. Leaders as a part of all decision-making processes shall use ORM as a tool to mitigate risk or establish the risk that will be accepted. Squadron CO's shall designate the risk acceptance levels in the Squadron

<u>Example:</u>	RISK ASSESSMENT CODE (RAC)	Acceptance Authority
	*1 Critical	Wing Commander
	2 Serious	Squadron CO
	3 Moderate	Department Head
	4 Minor	Immediate Supervisor
	5 Negligible	Individual

* Wing Commander shall approve all evolutions in which a RAC 1 is the residual risk. Wing Commander should be informed on any evolution that has an initial RAC 1 during the Risk Assessment phase.

e The ORM process shall be integrated into all levels of NAVTESTWINGLANT and NAVTESTWINGPAC operations.

(1) Hazards shall be identified, risks assessed, and controls developed and implemented during the earliest possible planning stages. Operations shall be continuously monitored for effectiveness of controls and situational changes.

(2) Information available through existing safety, training, and lessons learned databases should be considered whenever practicable in making risk decisions.

f ORM should be used during the review cycle of instructions. Routine questions should include but are not limited to the following:

(1) Does the instruction reduce risk to an acceptable level?

(2) Are there any hazards not identified in the instruction?

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(3) Does the instruction conflict with other guidance, thereby increasing the risk of misunderstanding?

g ORM Program Managers and Department Heads should supplement institutional ORM training with hands-on training scenarios developed to specific job skills

h The ORM program shall be a Command Inspection Item Squadron Commanders should establish a unit inspection program to insure that the fundamentals of the ORM process are being used correctly NAVTESTWINGLANT and NAVTESTWINGPAC Safety Department will develop and maintain an ORM inspection program as integral part of NAVTESTWINGLANT INST 5041 1

3 Training

a Squadron/unit CO's will appoint ORM instructors (graduate of Transportation Safety Institute (TSI) or Aviation Safety Officer (ASO) Course) CO's will appoint additional ORM instructors as required These additional instructors (Officer and Senior Enlisted) should hold leadership positions in major departments and have completed an ORM instructor course CO's may waive formal training based on the individuals' knowledge and practical experience in the ORM process The Naval Safety Center offers ORM training designed to expose entire commands to the basic principles of risk management Their teams will visit the command at the CO's request and will train officers, Chief Petty Officers, and enlisted in separately tailored sessions

b OPNAV/VCNO sponsors a two-day ORM application and integration course taught by TSI, which graduates an ORM Subject Matter Expert for the command The graduate is provided with the knowledge and materials to conduct unit-level training and will receive a designation as an ORM instructor NAVTESTWINGLANT and NAVTESTWINGPAC will coordinate with NAVAIR Safety to schedule training as required

c The Aviation Safety School in Monterey has incorporated ORM into the curricula of the ASO course, and the Aviation Safety Command course Graduates from these courses will receive designation as an ORM instructor With this knowledge, CO's, Executive Officers (XO's) and ASO's can provide command oversight of their ORM Program and also contribute directly to ORM training during All Officer Meetings, Safety Standowns, indoctrination, etc

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d The CNAF has developed an ORM information website (<https://www2.cnap.navy.mil>) Features of the website include

(1) ORM University ORM University is an on-line, e-learning software product that includes four courses tailored by seniority Students establish a student account upon initial login and may take courses piecemeal (self-paced), leaving a bookmark to return later Students proceed through chapters taking quizzes and a final exam, with the progress recorded by the web server Upon successful completion, the student may print a certificate of completion. Unit Program Managers and CO's will be given access to student completion records on the web site to monitor training performance of their units Course offerings and NAVTESTWINGLANT and NAVTESTWINGPAC completion goals follow

(a) ORM Fundamentals Written for E-1 and up, provides a basic primer on the concepts, principles and application of the five-step risk management process Upon completion, the student will have sufficient background to perform time-critical risk management both on and off-duty Shall be completed by all existing civilian and military personnel within 180 days with 50 percent completion in 90 days New check-ins within 30 days

(b) ORM Essentials for Leaders Building on its prerequisite, ORM fundamentals, the essentials for leaders course is written for those in positions of leadership Additional hazard identification tools are presented, as well as expanded discussion of techniques of employing the five steps Upon completion, the student will have sufficient background to perform deliberate or in-depth risk assessments An introduction to the use of the companion ORM software package Total Risk Assessment and Controls System (TRACS) is provided, enabling the student to successfully use TRACS to complete a deliberate or in-depth risk assessment Required for all civilian and military personnel in significant leadership positions (E-6 and above plus others identified by Command) Completed time frames are same as above

(c) ORM Application and Integration Written for unit ORM instructors and Program Managers This course builds on the previous courses and is the most detailed offered Material includes Navy-policy and ORM program coverage, in addition to ORM principles and processes Required for all Program Managers and instructors within 30 days of assignment

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(d) ORM Executive Overview Written for officers 0-5 and above, this course provides basic information on the concepts, principles, and application of the five-step process as well as training on unit ORM Program requirements, tools and resources Required for all 0-5 and above to include civilian equivalents Complete within 30 days of assignment

(2) TRACS TRACS is a web-based software application that assists the user in completing a deliberate or in-depth risk assessment Designed to assist a person tasked with performing such an assessment, the software guides the user through each of the five-steps in an intuitive fashion, with plenty of help screens and process information Upon completion, the user may print several reports Additionally, personal risk assessments are stored in the user's private library for future use, and may be recommended to TRACS administrators for inclusion in the TRACS public library of assessments for use by all personnel

(3) ORM reference information As an aid to Commanding Officers and unit program managers, ORM information has been consolidated on the web page (<https://www2.cnas.navy.mil>), providing access to the Naval aviation ORM joint policy message, OPNAV two-day ORM application and integration course schedule and "best practices" feedback from NSAWC and the training CARGRU's Additionally, links are provided to Navy ORM resources at the Safety Center and Aviation Safety School

(4) ORM Program Managers and CO's can establish accounts with ORM University and TRACS by logging in as a new user Once accounts are established, provide the following to NAVTESTWINGLANT or NAVTESTWINGPAC Safety via email

- (a) Rank
- (b) Full Name
- (c) Job Title
- (d) DSN and COMM Phone
- (e) E-mail Address

User privileges will be upgraded, permitting the ORM Program Manager to monitor ORM university course completion by unit personnel

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INTRODUCTION TO OPERATIONAL RISK MANAGEMENT (ORM)

1 Background NDP-1 (Naval Warfare) states, "By its nature, the uncertainty of war invariably involves the acceptance of risk. Because risk is often related to gain, leaders weigh risks against the benefits to be gained from an operation." We rely on the judgment of individual Commanders to balance the requirements of mission success with the inherent risks of military action. Naval leaders have always practiced risk management in their operational decision-making. However, the approach to risk, and degree of success in dealing with it, has varied widely depending on the leader and his/her level of training and experience. The principles of ORM can be taught and effectively applied throughout the Navy and Marine Corps to enhance the decision-making capabilities of our personnel. Many ORM techniques are currently incorporated into our operational planning and decision-making processes. The evaluation and war-gaming of different courses of action, the establishment of mission go/no-go criteria, the employment of maximum/minimum operating envelopes, and the use of mission/confirmation briefings are all examples of how Commanders and units evaluate and manage risk. In addition to continuing to utilize these techniques, the remainder of this enclosure outlines a formalized process, which may be applied in dealing with risk.

2 Concept The ORM process

a Is a decision making tool used by people at all levels to increase operational effectiveness by anticipating hazards and reducing the potential for loss, thereby increasing the probability of a successful mission

b Increases our ability to make informed decisions by providing the best baseline of knowledge and experience available

c Minimizes risks to acceptable levels, commensurate with mission accomplishment. The amount of risk we will take in war is much greater than that we should be willing to take in peace, but the process is the same. Applying the ORM process will reduce mishaps, lower costs, and provide for more efficient use of resources

3 Terms

a Hazard - A condition with the potential to cause

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personal injury or death, property damage or mission degradation

b Risk - An expression of possible loss in terms of severity and probability

c Risk Assessment - The process of detecting hazards and assessing associated risks

d ORM - The process of dealing with risk associated within military operations, which include risk assessment, risk decision-making and implementation of effective risk controls

4 Process The five-step process is

a Identify Hazards - Begin with an outline or chart of the major steps in the operation (operational analysis) Next, conduct a Preliminary Hazard Analysis by listing all of the hazards associated with each step in the operational analysis along with possible causes for those hazards

b Assess Hazards - For each hazard identified, determine the associated degree of risk in terms of probability and severity Although not required, the use of a matrix may be helpful in assessing hazards described further in paragraph(d)

c Make Risk Decisions - First, develop risk control options Start with the most serious risk first and select controls that will reduce the risk to a minimum consistent with mission accomplishment With selected controls in place, decide if the benefit of the operation outweighs the risk If risk outweighs benefit or if assistance is required to implement controls, communicate with higher authority in the chain of command

d Implement Controls - The following measures can be used to eliminate hazards or reduce the degree of risk These are listed by order of preference

(1) Administrative Controls - Controls that reduce risks through specific administrative actions, such as

(a) providing suitable warnings, markings, placards, signs, and notices

(b) establishing written policies, programs instructions and standard operating procedures

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(c) training personnel to recognize hazards and take appropriate precautionary measures

(d) limiting the exposure to a hazard either by reducing the number of personnel/assets or the length of time they are exposed

(2) Engineering Controls - Controls that use engineering methods to reduce risks by design, material selection or substitution when technically or economically feasible

(3) Personal Protective Equipment - Serves as a barrier between personnel and a hazard. It should be used when other controls do not reduce the hazard to an acceptable level

e Supervise - Conduct follow-up evaluations of the controls to ensure they remain in place and have the desired effect. Monitor for changes, which may require further ORM. Take corrective action when necessary.

5 ORM Process Levels The ORM process exists on three levels. The Commander selects which level based upon the mission, the situation, the time available, the proficiency level of personnel and the assets available. While it would be preferable to perform a deliberate or in-depth risk management process for all evolutions, the time and resources to do so will not always be available. One of the objectives of ORM training is to develop sufficient proficiency in applying the process such that ORM becomes an automatic or intuitive part of our decision-making methodology. In the operational environment, leaders should be able to employ this time-critical process to make sound and timely decisions that generate tempo and facilitate decisive results. The three levels are as follows:

a Time-critical - An "on the run" mental or oral review of the situation using the five-step process without recording the information on paper. The time critical level of ORM is employed by experienced personnel to consider risk while making decisions in a time-compressed situation. It is the normal level of ORM used during the execution phase of training or operations, as well as in planning during crisis response scenarios. It is particularly helpful in choosing the appropriate course of action when an unplanned event occurs during the execution of a planned operation or daily routine.

b Deliberate - Application of the complete five step

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process as depicted in Figure 1 in planning an operation or evaluating procedures. It uses primarily experience and brainstorming to identify hazards and develop controls, and is therefore most effective when done in a group. Examples of deliberate applications include planning of upcoming operations, review of standard operating, maintenance or training procedures, and damage control/disaster response planning.

c In-Depth - Deliberate process with a more thorough risk assessment (first two of the five steps) involving research of available data, use of diagram and analysis tools, formal testing or long term tracking of the hazards associated with the operation (sometimes with assistance from technical experts) to identify and assess the hazards. It is used to more thoroughly study the hazards and their associated risk in a complex operation or system, or one in which the hazards are not well understood. Examples of in-depth applications include long term planning of complex operations, introduction of new equipment, materials and missions, development of tactics and training curricula and major system overhaul or repair.

6 Principles of ORM ORM incorporates the following four principles

a Accept risk when benefits outweigh the cost Fleet Marine Force Manual I (WAR FIGHTING) states, "Risk is inherent in war and is involved in every mission. Risk is also related to gain, normally greater potential gain requires greater risk." Our naval tradition is built upon principles of seizing the initiative and taking decisive action. The goal of ORM is not to eliminate risk, but to manage the risk so that the mission can be accomplished with the minimum amount of loss.

b Accept no unnecessary risk Fleet Marine Force Manual I also states, "We should clearly understand that the acceptance of risk does not equate to the imprudent willingness to gamble. Take only risks, which are necessary to accomplish the mission."

c Anticipate and manage risk by planning Risks are more easily controlled when they are identified early in the planning process.

d Make risk decisions at the right level Risk management decisions are made by the leader directly responsible for the operation. Prudence, experience, judgment, intuition, and situational awareness of leaders directly involved in the planning and execution of the mission are the critical elements.

in making effective risk management decisions. When the leader responsible for executing the mission determines that the risk associated with that mission **cannot be controlled at his/her level**, or goes beyond the commander's stated intent, he/she **shall elevate the decision to their chain of command**.

7 Risk Assessment Matrix A matrix can be used to accomplish the second step of the ORM process. Using a matrix to quantify and prioritize the risk(s) does not lessen the inherently subjective nature of risk assessment. However, a matrix does provide a consistent framework for evaluating risk. Although different matrices may be used for various applications, any risk assessment tool should include the elements of hazard severity and mishap probability. The RAC defined by a matrix represents the degree of risk associated with a hazard considering these two elements. While the degree of risk is subjective in nature, the RAC does accurately reflect the relative amount of perceived risk between various hazards. The example matrix described below is used in Naval Occupational Safety and Health assessments. Using the matrix, the RAC is derived as follows:

a Hazard Severity - An assessment of the worst credible consequence, which can occur as a result of a hazard. Severity is defined by potential degree of injury, illness, property damage, loss of assets (time, money, personnel) or effect on mission. The combination of two or more hazards may increase the overall level of risk. Hazard severity categories are assigned as Roman numerals according to the following criteria:

(1) Category I - The hazard may cause death, loss of facility/asset or result in grave damage to national interests

(2) Category II - The hazard may cause severe injury, illness, property damage, damage to national or service interests or degradation to efficient use of assets

(3) Category III - The hazard may cause minor injury, illness, property damage, damage to national, service or command interests or degradation to efficient use of assets

(4) Category IV - The hazard presents a minimal threat to personnel safety or health, property, national, service or command interests or efficient use of assets

b Mishap Probability - The probability that a hazard will result in a mishap or loss, based on an assessment of such

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factors as location exposure (cycles or hours of operation), affected populations, experience or previously established statistical information Mishap probability will be assigned an English letter according to the following criteria

(1) Sub-category A - Likely to occur immediately or within a short period of time Expected to occur frequently to an individual item or person or continuously to a fleet, inventory or group

(2) Sub-category B - Probably will occur in time Expected to occur several times to an individual item or person or frequently to a fleet, inventory or group

(3) Sub-category C - May occur in time Can reasonably be expected to occur some time to an individual item or person or several times to a fleet, inventory or group

(4) Sub-category D - Unlikely to occur

c Risk Assessment Code - The RAC is an expression of risk, which combines the elements of hazard severity and mishap probability Using the matrix shown below, the RAC is expressed as a single Arabic number that can be used to help determine hazard abatement priorities

Figure 1
Mishap Probability

Hazard Severity	A	B	C	D
I	1	1	2	3
II, III	1	2	3	4
IV	2	3	4	5
	3	4	5	5

RAC Definitions

- 1 - Critical
- 2 - Serious
- 3 - Moderate
- 4 - Minor
- 5 - Negligible

Note 1 In some cases, the worst credible consequence of a hazard may not correspond to the highest RAC for that hazard For example, one hazard may have two potential consequences The severity of the worst consequence (I) may be unlikely (D), resulting in a RAC of 3 The severity of the lesser consequence

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(II) may be probable (B), resulting in a RAC of 2. Therefore, it is also important to consider less severe consequences of a hazard if they are more likely than the worst credible consequence, since this combination may actually present a greater overall risk.

Note 2 The ORM process provides an additional tool for commanders to use in reducing risks inherent in military operations. It is not a complete change in the way we approach the risk management problem, but rather provides a specific methodology for personnel to anticipate hazards and evaluate risk. Just as we have trained our personnel to focus on the mission, we can train our personnel to evaluate risk as part of their decision making process. As personnel are trained in and use the process, ORM will become intuitive, being applied automatically as a means to aid in quickly developing an effective course of action to accomplish the mission.

8 Example In preparation for an amphibious exercise, a deck officer might use ORM to plan for launching small boats.

a Step 1 - Identify Hazards

Operational Analysis
 Muster deck watch section
 Brief
 Man launch positions
 Attach lines and load boats
 Move boats over water and lower
 Detach lines and retrieve
 Small boats move away from ship
 Stow lines
 Muster deck watch section

b Preliminary Hazard Analysis For each step of the operational analysis, list any hazards which might result in personnel injury/death, property damage or mission degradation.

Hazards

Causes

Personnel slips/falls

Wet deck
 Gear adrift
 Rushing

Time/position requirements
 Requirements confused

Incomplete/Inaccurate brief

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Boat overloaded	Inadequate training Crew complacency
Improperly attached lines	same as above
Lost control of boats (resulting in death/injury, damage or delay/abort of launch)	Material casualty (davit, crane or hardness failure) High sea state Improper procedures (winch, davit operation) Improper positioning (boat crew and boat)
Man overboard	same as above
Lines tangled/knotted	same as above Improperly attached lines
Small boats unable to break away from the ship	Small boat engine failure Suction effect from ship

c Step 2 - Assess Hazards Assess each hazard identified in terms of severity and probability of possible loss For example, the deck officer might assess the hazard "Lost control of boats" using the Risk Assessment Matrix as follows

(1) Consider possible consequences of hazard severity

(a) Death, boat knocks someone unconscious and overboard or crushes them between the ship and the boat (I)

(b) Severe injury, boat rolls, (II) crewman slips and breaks bones

(c) Severe small boat or ship damage (II)

(d) Boat launch(es) delayed or even aborted, resulting in diminished reconnaissance support for the amphibious landing and possibly delaying H-hour due to insufficient surf reports (III for training environment, I for actual combat)

(2) Determine probability of loss from hazard based on past experience, available safety data, the weather forecast, and information about the operations area, assigned personnel, the number of small boats and the assigned mission

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(a) With current procedures and personnel, the probability of a death during small boat operations is considered unlikely (D)

(b) Although small boat operations have not been a problem on this ship in the past few years, frequent small boat mishaps in the fleet and the number of potential causes lead the deck officer to conclude that a small boat mishap resulting in severe injury or damage and delayed boat launches probably will occur in time (B)

(3) Determine the RAC Based on the following analysis, the hazard "Lost Control of Boats" would be assigned a RAC of 2, and prioritized with other hazards based on most serious RAC

(a) Entering the matrix with severity I and probability D gives a RAC of 3 for personnel death during small boat launch

(b) Entering the matrix with severity II and probability B gives a RAC of 2 for severe injury or damage

(c) Entering the matrix with severity III and probability B gives a RAC of 3 for delayed launch or abort during training exercise

d Step 3 - Make Risk Decisions

(1) Beginning with most serious risks first (lowest RAC), consider risk control options For example, some controls for the hazard of lost control of boats might include thorough equipment checkout prior to the exercise, review of key procedures during brief, practice launch of empty boats prior to exercise, stationing supervisor/observer to monitor proper position and procedures and wearing helmets

(2) Determine if benefit outweighs risk with selected controls in place The deck officer decides the risk is acceptable with the above controls in place However, he must coordinate with the Captain to conduct the pre-exercise launch

e Step 4 - Implement Controls The deck officer might draft a pre-exercise plan, which establishes a requirement to check the equipment, delineates key procedures to be briefed, schedules the practice launch and assigns supervisor responsibility Existing applicable SOPs should be referenced

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f Step 5 - Supervise

(1) Monitor the evolution for any changes, which might present new hazards. Ensure appropriate supervisors enforce established procedures and follow through with selected controls.

(2) Adjust controls, which are ineffective.

(3) After the evolution, determine which controls were effective and ensure they are implemented for future, similar evolutions.